REMARKS

The Official Action mailed May 14, 2002 has been received and its contents carefully noted. Filed concurrently herewith is a *Request for Two Month Extension of Time*, which extends the shortened statutory period for response to October 14, 2002. Accordingly, Applicants respectfully submit that this response is being timely filed.

Applicants note with appreciation the consideration of the Information Disclosure Statements filed on July 28, 1999, February 11, 2002 and February 15, 2002.

Claims 45-72 were pending in the present application. Claims 51, 55, 59, 63 and 66 have been canceled and claims 45, 49, 52, 56, 60 and 64 have been amended herewith. Claims 45-50, 52-54, 56-58, 60-62, 64, 65 and 67-72 are now pending in the present application, of which claims 45, 49, 52, 56, 60 and 64 are independent. For the reasons set forth in detail below, these claims are believed to be in condition for allowance.

The application is related to a method for manufacturing a semiconductor device comprising steps of providing a material for promoting crystallization to at least a part of a semiconductor film formed over a substrate, subjecting the semiconductor film to plasma to form a gate insulating film on the semiconductor film, and crystallizing the semiconductor film after subjecting the semiconductor film to the plasma to obtain a crystalline semiconductor film.

The Official Action rejects claims 45, 47, 60, 62, 63 and 67-72 as obvious based on the combination of U.S. Patent 5,624,873 to Fonash et al. and U.S. Patent 5,851,860 to Makita et al. Further, the Official Action rejects claims 46, 49-59, 61 and 64-66 as obvious based on the combination of Fonash, Makita and U.S. Patent No. 6,066,516 to Miyasaka et al.

As stated in MPEP § 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the

teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In response to the Official Action, the Applicants have amended independent claim 45 to correct minor matters of form. Independent claims 49, 52, 56, 60 and 64 have been amended to recite subjecting the semiconductor film to a plasma to form a gate insulating film on the semiconductor film. It is respectfully submitted that the prior art, either alone or in combination, does not teach or suggest all the features of the independent claims and that a *prima facie* case of obviousness cannot be maintained for at least this first reason.

Fonash discloses a fabrication process which includes exposing a-Si film to a particle flux (e.g. a plasma or neutral beam) to enhance crystallization before a crystallization step. However, it does not appear that Fonash discloses exposing a-Si film to the plasma to form the gate insulating film thereon. In addition, the Applicants respectfully submit that the gate insulating film of the present invention could not be formed by the plasma step of Fonash, because, as disclosed in Embodiment 5 of the specification, the plasma process of the present invention is conducted under at a temperature condition of 450 ± 20°C. This temperature condition is not disclosed or suggested in Fonash.

Makita and Miyasaka do not cure the deficiencies in Fonash. It appears that Makita discloses a step of introducing a metal catalyst into a film to promote crystallization. Miyasaka is relied upon to teach crystallization with a laser. The prior art, either alone or in combination, does not teach or suggest subjecting a semiconductor film to a plasma to form a gate insulating film on the semiconductor film.

Accordingly, reconsideration and withdrawal of the rejection of pending claims 45-50, 52-54, 56-58, 60-62, 64, 65 and 67-72 under 35 U.S.C. § 103(a) is in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please cancel claims 51, 55, 59, 63 and 66 and amend claims 45, 49, 52, 56, 60 and 64 as follows:

45. (Amended) A method for manufacturing a semiconductor device comprising steps of:

[contacting] providing a material for promoting crystallization to at least a part of a semiconductor film formed over a substrate;

subjecting said semiconductor film to oxygen plasma[, thereby] to form a gate insulating film [is formed] on said semiconductor film; and

crystallizing said semiconductor film [subjected] after subjecting said semiconductor film to the oxygen plasma to obtain a crystalline semiconductor film.

49. (Amended) A method for manufacturing a semiconductor device comprising steps of:

[contacting] providing a material for promoting crystallization to at least a part of a semiconductor film formed over a substrate;

subjecting said semiconductor film to plasma comprising oxygen and helium to form a gate insulating film on said semiconductor film; and

irradiating said semiconductor film [subjected] after subjecting said semiconductor film to the plasma with one of an infrared ray and a laser light.

52. (Amended) [322]A method for manufacturing a semiconductor device comprising steps of:

[contacting] providing a material for promoting crystallization to at least a part of a semiconductor film formed over a substrate;

subjecting said semiconductor film to oxygen plasma to form a gate insulating film on said semiconductor film; [and]

crystallizing said semiconductor film [subjected] after subjecting said semiconductor film to the oxygen plasma using said material, to obtain a crystalline semiconductor film;

patterning said crystalline semiconductor film and said gate insulating film;

forming a second gate insulating film so as to cover said crystalline semiconductor film and said gate insulating film after patterning them.

56. (Amended) A method for manufacturing a semiconductor device comprising steps of:

[contacting] providing a material for promoting crystallization to at least a part of a semiconductor film formed over a substrate;

subjecting said semiconductor film to oxygen plasma to form a gate insulating film on said semiconductor film;

irradiating said semiconductor film [subjected] after subjecting said semiconductor film to the oxygen plasma with one of an infrared ray and a laser light; and

patterning said crystalline semiconductor film.

60. (Amended) A method for manufacturing a semiconductor device comprising steps of:

[contacting] providing at least one metal element to at least a part of a semiconductor film formed over a substrate;

subjecting said semiconductor film to plasma to form a gate insulating film on said semiconductor film;

crystallizing said semiconductor film [subjected] after subjecting said semiconductor film to the oxygen plasma to obtain a crystalline semiconductor film; and

patterning said crystalline semiconductor film.

64. (Amended) A method for manufacturing a semiconductor device comprising steps of:

[contacting] providing at least one metal element to at least a part of a semiconductor film formed over a substrate;

subjecting said semiconductor film to plasma to form a gate insulating film on said semiconductor film; and

irradiating said semiconductor film [subjected] after subjecting said semiconductor film to the oxygen plasma with one of an infrared ray and a laser light.